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ORIGINAL ARTICLE

A Comparative Analysis of Outcome of Open Reduction and Internal Fixation of Mandibular Fracture With or Without Intermaxillary Fixation

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ABSTRACT

Aim: To evaluate the difference and functional outcome between open reduction and internal fixation (ORIF) and intermaxillary fixation (IMF) in mandibular fractures.

Study Design: Retrospective study.

Place and Duration of Study: Department of Oral and Maxillofacial Surgery, Faryal Dental College, Sheikhupura, Lahore from 1st February 2019 to 31st January 2021.

Methodology: One hundred and fifty seven patients treated for fractures of mandible and reviewed their prognosis based on use of intermaxillary fixation after reduction of fracture. The patients were divided into two groups; Manual reduction group without the intermaxillary fixation and the intermaxillary fixation group.

Results: Good results have been obtained in most patients after mandible fracture reduction. However, complications occurred in 19 (27.5%) patients in group 2 after surgery. 6 patients had an infection, 4 patients had a wound dehiscence, and 4 patients had osteomyelitis. No loosening of the mounting bolts and/or crack of the mounting plates was observed. Correct occlusion was achieved using posterior arch wires and elastic rings in 2 malocclusion patients. Occlusion failed in two patients in Group 1 due to osteomyelitis, and the second operation was performed under general anaesthesia. The mean complication severity scores for Group 1 and Group 2 were 1.37 and 1.38, respectively, with no significant difference.

Conclusion: Among the patients treated with manual reduction, 2 patients had malocclusion and 1 patient required a new surgery. Such a simple mandible fracture can give good results even with manual reduction without intermaxillary fixation. For a simple mandible fracture, only manual reduction without intermaxillary fixation or intermaxillary fixation was recommended for a short time.

Key words: Complication, Fracture, Internal fixation, Mandible

INTRODUCTION

As society becomes more and more complex as population, traffic, urbanization and industrialization increase, road accidents, industrial accidents, falls, violence and explosions can be expected to increase simultaneously.[1-2] As a consequence, an increase in the number of craniofacial fractures is expected. Due to the anatomical shape of the protrusion of the mandible, which is unique among the bones of the face, the fracture rate is second only to those of the nose.[3-4] The mandible fracture had 64% of patients treated for the fracture of maxillofacial area. The mandible plays an important role in sensation, congestion, and chewing.[5-6] It also determines the appearance of the lower face. Therefore, for mandible fractures, a precise reduction is required to recover the face shape and minimize functional changes.[7-8] It is necessary to take into account not only functional but also aesthetic aspects. In the past, many oral and maxillofacial surgeons have used primarily the interosseous fixation (IMF) and interosseous wirings as a prophylactic treatment for the mandibular symphysis.[9-10] With the advent of monocortical mini plates, both patient occlusion and precise mandible reduction have become possible, raising questions about the need for an IMF.[11]

MATERIALS AND METHODS

This retrospective study was carried out at Department of Oral and Maxillofacial Surgery, Faryal Dental College, Sheikhupura, Lahore over a period of two years from 1st February 2019 to 31st January 2021 and comprised 157 patients. Midfacial fractures, fractures of maxillary, condyle, cases of mixed and edentulous teeth were excluded, respectively. The age, sex and cause of the fracture were examined for each patient. Assessment of infection, wound dehiscence, osteomyelitis and malocclusion for postoperative complications were recorded. Panoramic photos taken immediately after the surgery and 1 month after the surgery, loosening of the fixing screws, fractures of the mini-plates, defective / non-union were examined. These findings were classified according to the severity of complications as follows:

Score 1: Patients who recovered under local anaesthesia after antibiotics, regular sterilization and simple surgeries. Score 2: The individuals who needed postsurgical traction or IMF by elastic rings due to malocclusion. Score 3: Due to osteomyelitis or defective union/non-union patients requiring surgery. Patients were divided into two groups depending on whether they were receiving IMF or not. Group 1 included cases where the reduction of the mandible fracture was achieved with the

use of arch bars. Group 2 included cases where manual reduction methods without arc bars or IMF were done. After reduction of bone fragments with monocortical screws and 2.0 mm titanium plates, invasive reduction was performed according to Champy's techniques and follow-up visits continued. We statistically assessed reoperation rate, complication rate, and intergroup complication scores using an independent t-test (SPSS Inc., Chicago, IL, USA) version of SPSS 22.0. We consider P<0.05 to be statistically significant.

RESULTS

The simple fracture at the sub midline, mandibular midline, angle and body were analyzed retrospectively. Ninety two patients (58.6%) passed the IMF and 65 patients (41.40%) received a manual reduction without IMF. In group 1, 76 patients were male (86.4%) and 12 were female (13.6%). Their age ranges from 19 to 59, and the average age is 38.1. In group 2, 46 patients were men (66.6%) and 23 women (33.3%). Their age ranges from 21 to 65, and the average age is 34.8. Depending on the cause of the fracture, the most common causes are given in Table 1. Good results have been obtained in most patients after mandible fracture reduction. However, complications occurred in 19 patients (27.5%) in group 2 after surgery. 6 patients had an infection, 4patients had a wound dehiscence, and 4 patients had osteomyelitis. No loosening of the mounting bolts and/or crack of the mounting plates were observed.

The correct occlusion was achieved using posterior arch wires and elastic rings in 2 malocclusion patients. Occlusion failed in two patients in Group 1 due to osteomyelitis, and the second operation was performed under general anesthesia. The mean complication severity scores for Group 1 and Group 2 were 1.37 and 1.38, respectively, with no significant difference.

Table 1: Demographic information of the patients (n=157)

Parameter	Group 1 (n=88)	Group 2 (n=69)
Gender		
Male	75 (86.4%)	55 (79.7%)
Female	13 (13.6%)	14 (20.3%)
Mean age (years)	38.1±4.2	34.8±3.9
Mechanism of Fx		
Assault	38 (43.2%)	42 (60.9%)
TA	13 (14.8%)	7 (10.1%)
Slip down	20 (22.7%)	10 (14.5%)
Fall	6 (6.8%)	4 (5.8%)
Sports	11 (12.5%)	6 (8.7%)
Fracture site		
Symphysis	10 (11.4%)	6 (8.7%)
Para symphysis	29 (33.0%)	24 (34.8%)
Body	9 (10.2%)	5 (7.2%)
Angle	40 (45.5%)	34 (49.3%)

Table 2: Final outcome of the patients

Outcome	Group 1 (n=88)	Group 2 (n=69)
Normal result	66 (75.0%)	72.5 (72.5)
Infection	8 (9.1%)	6 (8.7)
Wound dehiscence	4 (4.5%)	4 (5.8)
Loosed screw/plate fracture	4 (4.5%)	-
Osteomyelitis	2 (2.3%)	4 (5.8)
Malocclusion	2 (2.3%)	5 (7.2)
Malunion/nonunion	2 (2.3%)	-
Mean score	1.37	1.38
Re-operation	2 (2.3%)	-

DISCUSSION

Internal stabilization of fractures is always headed by the reduction of fractured fragments. In the case of mandibular fractures, this reduction can be done by the IMF, with manual reduction. In everyday practice, the reduction begins when the IMF is applied or when the dislocation is manually neutralized. Furthermore, if the cases are more complex or less stable, the reduction can be simplified and improved by using the reduction brackets. Until now, IMF has been used in oral and maxillofacial surgery to treat patients with mandible fractures to remove sensitive blockages and reduce fractures.[11-12]

Intermaxillary fixation is made with wires, IMF bolts and strip strips. Arch bars in particular are useful for reshaping crushed bone fragments and for immobilizing the entire mandible.[13-14] In addition, the arch bars themselves act as tightening straps, thus preventing force distribution at reduction. In addition, in cases where initial immobilization fails after surgery or a minor malocclusion occurs, this may facilitate the achievement of a normal bite in conjunction with arch bars, elastic loops or wires.[15-16] In the present study, the arch was inserted in 2 patients with postoperative malocclusion, the IMF was performed with flexible rings and good results were obtained. However, the IMF can have several side effects. Regarding the use of arch bars, Thapliyal et at[17] and Saad and Shuman[18] reported that they can damage the teeth, adjacent periodontal tissues, and the oral mucosa. They reported the possibility of contamination due to difficult use and poor oral hygiene, the risk to dentists with skin lesions while using braces, and the long treatment time required to insert and removed the strip rod.

In addition, Olivetto et al[19] and Cosimo et al[20] reported that tidal volume per breath decreased by up to 40% in patients who underwent IMF. However, while IMF screws can reduce opportunistic infections due to skin lesions and simplify the oral hygiene of patients, the procedure can also be performed more simply for a shorter amount of time. However, screws are also prone to loosening and breakage can cause tooth injuries, among other things. The use of screws is limited in patients with multiple fractures, toothless or mixed teeth. Coletti et al[21] reported that 39% of patients treated with mini-bolts experienced side effects. The most common side effect was loosening of the IMF screw, which was observed in 29%. In group 2 of our study, the overall incidence of complications was 27.5%. Compared to group 1, no statistically significant difference was observed. As for the cases where the second operation was performed due to serious complications, only 2 cases from Group 1 required re-operation; Therefore, we could not assess statistical significance by group 2. Moreover, when the scores were classified according to the severity of complications and when the two groups were compared, no difference was observed. Bell and Wilson reported that in the treatment of patients with mandibular angle fractures, complications related to arch rods or Stout wires were not significantly different from those associated with manual reduction. Complications requiring secondary treatment occurred in 16% of patients. However, most cases are resolved with a simple incision, drainage, and mini-plate removal.

Kumaran and Soh[22] and Liu et al[23] compared the occlusion results between the group with IMF and the group without IMF. In the first period, occlusion was not stable in the manual reduction group. However, after 3 months, no significant difference was observed. However, in this study, all 2 malocclusion patients had mandible angle fractures, so more care should be taken in manual reduction of the mandible angle fracture. Khoshsirat et al[24] reported that manual reduction without IMF has the advantage of being able to easily provide the clinician with a direct field of view compared to cases involving IMF. For reduction, they suggested that the mini-plate should first be fixed on the proximal bone fragment, and then the bone fragments should be reduced to match the occlusion and fixation of further bone fragments. Dergin et al[25] reported that cases where surgery is performed by inexperienced dentists and residents are not an indication for manual reduction as IMF is still required. In order to obtain an accurate bite, all experienced assistants play an important role in maintaining the reduced bone fragments and the suction and traction functions. Moreover, Mohd et al[26] reported that in the reduction of bone fragments, if IMF is not performed, it is important to precisely reduce the displaced bone fragments, and adequate anatomical reduction can be achieved by precise alignment of the mandible edges and conjugation of bone fragments. Koshsirat et al[24] also reported that for manual reduction without IMF, compared to IMF cases, surgery time may be reduced and early discharge is possible, reducing treatment costs.

CONCLUSION

Among the patients treated with manual reduction, 2 patients had malocclusion and 1 patient required a new surgery. Such a simple mandible fracture can give good results even with manual reduction without IMF. For a simple mandible fracture, only manual reduction without IMF or IMF was recommended for a short time.

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